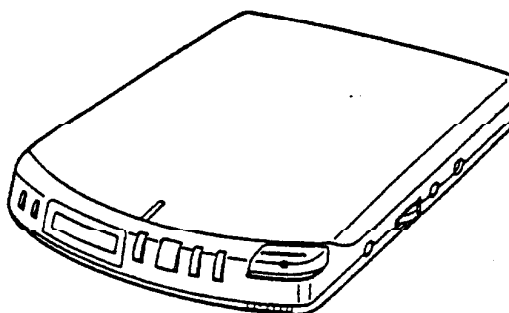


PRD-650MC/650WN

SERVICE MANUAL

US Model
Canadian Model
PRD-650MC/650WN
AEP Model
UK Model
E Model
PRD-650WN



Model Name Using Similar Mechanism	PRD-250MC/250WN
Optical Device Name	CDM-650
Optical Pick-Up Name	DAX-02S

SPECIFICATIONS

Disc

Disc	
Acceptable discs	Photo CD (single or multisession) discs CD-ROM mode-1 data discs CD-ROM mode-2 form 1, form 2 data discs CD-Audio discs Video CD CD Extra (CD+)
Disc diameter	12 cm, 8 cm
Rotational speed (varies from disc to disc)	
Normal speed	200 rpm to 530 rpm
4x speed	800 rpm to 2120 rpm
6x speed	1200 rpm to 3180 rpm

Drive Performance

Data transfer rate	
Sustained rate	600 Kbytes/s (4x speed) 900 Kbytes/s (6x speed)
Burst rate	5.0 Mbytes/s

Access time	
Full stroke	750 ms
Average (1/2 STROKE)	280 ms

Reliability

Read error rate (includes 5 retries)	
L-EC on	1 block/10 ¹² bits (typical)
L-EC off	1 block/10 ⁹ bits (typical)

Audio

Output level (at 6 V input level)	
Line output	0.78 V at 47 Kohm
Headphone output	12 mW + 12 mW at 16 ohm

Environment

Operating Temperature	5°C to 35°C (41°F to 95°F)
Humidity	10% to 80%
Atmosphere	Noncondensing

Laser Diode Properties

Material	GaAlAs
Wavelength	780 nm
Emission Duration	Continuous
Laser Output	Less than 44.6 μ W
* This output is the value measured at a distance of 200 mm from the objective lens surface on the Optical Pick-up Block.	

Dimensions and Mass

Dimensions	Approx. 132.5 x 26.5 x 167.9 mm (w/h/d) (5 1/4 x 1 1/8 x 6 5/8 inches)
Mass	Approx. 291 g (10 oz)

Power Requirement

- DC IN 6V jack accepts the Sony AC power adaptor.
- 3.6V DC Rechargeable battery pack LIP-12(H)
- 6V DC four size AA (LR6) alkaline batteries

PCMCIA Card Specifications

Dimensions	85.6 x 54.0 x 5.0 mm (w/h/d) (3 3/8 x 2 1/8 x 1/2 inches)
Mass	24.0 g (1 oz)
Operating temperature	5 °C to 35 °C (41 °F to 95 °F)
Operating humidity	10 % to 90 %
Required voltage	5 V \pm 0.5 V
DC current required	10 mA



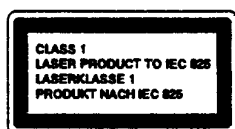
PORTABLE CD-ROM DRIVE
SONY

TABLE OF CONTENTS

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CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



This CD-ROM drive unit is classified as a CLASS 1 LASER product. The CLASS 1 LASER PRODUCT label is located on the bottom.

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ OR DOTTED LINE WITH MARK Δ ON THE SCHEMATIC DIAGRAMS AND IN THE PARTS LIST ARE CRITICAL TO SAFE OPERATION. REPLACE THESE COMPONENTS WITH SONY PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL OR IN SUPPLEMENTS PUBLISHED BY SONY.

CAUTION

Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the equipment manufacturer. Discard used batteries according to manufacture's instructions.

ADVARSEL!

Lithiumbatteri-Eksplosionsfare ved fejlagtig håndtering.
Udskiftning må kun ske med batteri af samme fabrikat og type.
Lever det brugte batteri tilbage til leverandøren.

ADVARSEL

Eksplosjonsfare ved feilaktig skifte av batteri.
Benytt samme batteritype eller en tilsvarende type anbefalt av apparatfabrikanten.
Brukte batterier kasseres i henhold til fabrikantens instruksjoner.

VARNING

Explosionsfara vid felaktigt batteribyte.
Använd samma batterityp eller en likvärdig typ som rekommenderas av apparattillverkaren.
Kassera använt batteri enligt gällande föreskrifter.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu.
Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Flexible Circuit Board Repairing

- Keep the temperature of the soldering iron around 270 °C during repairing.
- Do not touch the soldering iron on the same conductor of the circuit board (within 3 times).
- Be careful not to apply force on the conductor when soldering or unsoldering.

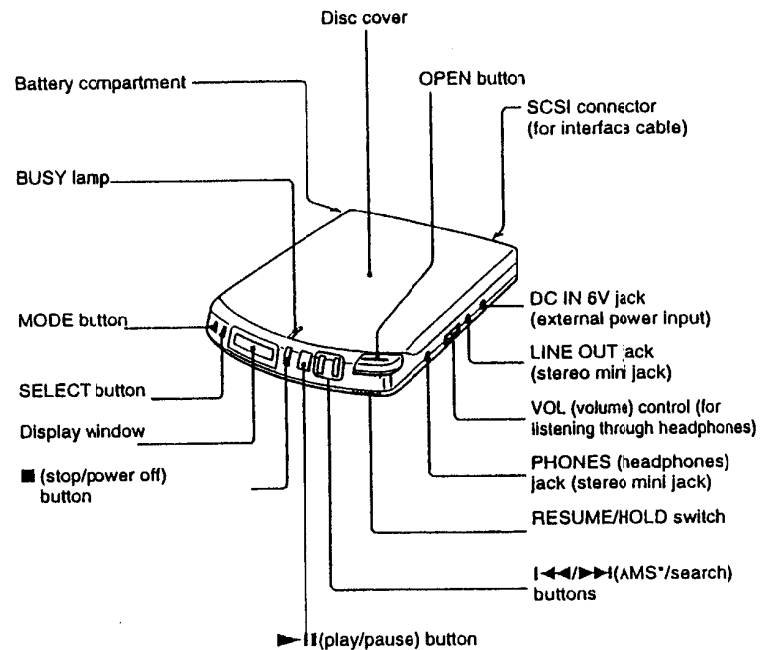
Notes on chip component replacement

- Never reuse a disconnected chip component.
- Notice that the minus side of a tantalum capacitor may be damaged by heat.

ATTENTION AU COMPOSANT AYANT RAPPORT À LA SÉCURITÉ!

LES COMPOSANTS IDENTIFIÉS PAR UNE MARQUE Δ SUR LES DIAGRAMMES SCHÉMATIQUES ET LA LISTE DES PIÈCES SONT CRITIQUES POUR LA SÉCURITÉ DE FONCTIONNEMENT. NE REMPLACER CES COMPOSANTS QUE PAR DES PIÈCES SONY DONT LES NUMÉROS SONT DONNÉS DANS CE MANUEL OU DANS LES SUPPLÉMENTS PUBLIÉS PAR SONY.

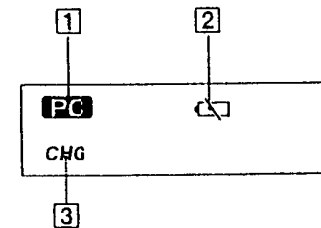
Identifying the Parts



*AMS: Automatic Music Sensor

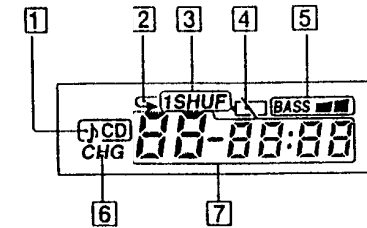
Identifying the Parts

- CD-ROM mode -



- 1 **PC (CD-ROM mode) indicator**
Appears when the drive is in CD-ROM mode.
- 2 **(battery) indicator**
Appears when the battery is low.
- 3 **CHG (charge) indicator**
Appears when the rechargeable lithium-ion battery (not supplied*) is charging.

- Discman mode -



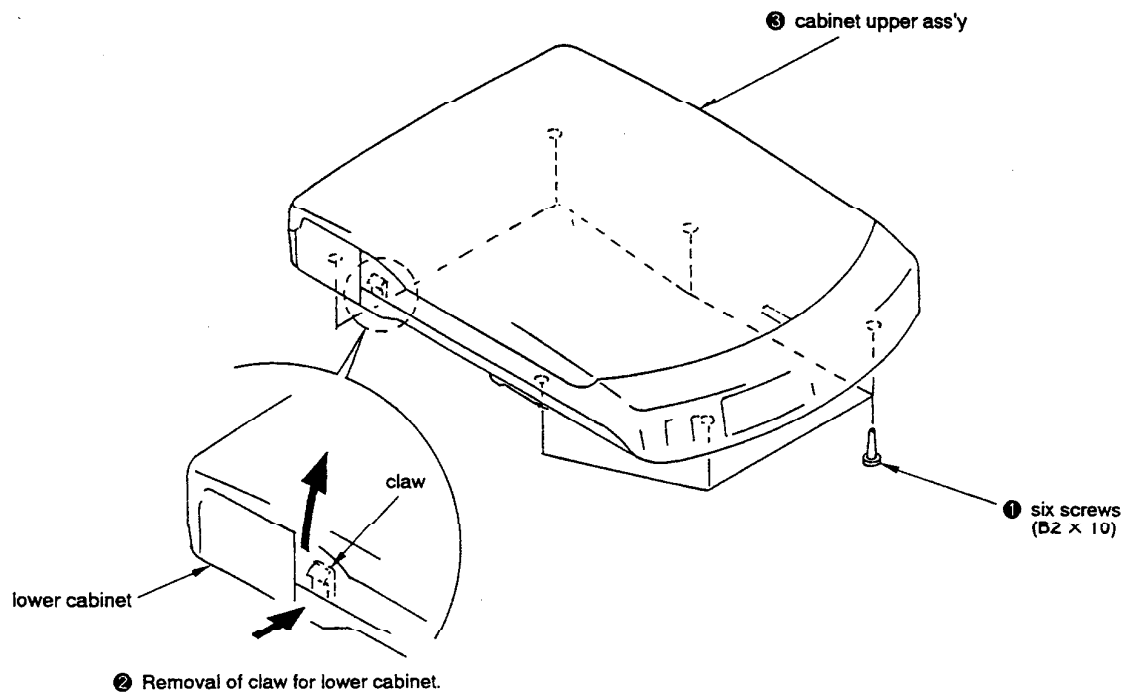
- 1 **CD (Discman mode) indicator**
Appears when the drive is in audio CD Discman mode.
- 2 **(repeat) indicator**
Appears when the repeat mode is on.
- 3 **1/SHUF (play modes) indicator**
The corresponding indicator appears when an audio CD is inserted.
1 : Play a single selection
SHUF : All selections in random order.
- 4 **(battery) indicator**
Appears when the battery is low.
- 5 **BASS (bass boost) indicator**
Appears when the bass sound is increased (to two levels).
- 6 **CHG (charge) indicator**
Appears when the rechargeable lithium-ion battery (not supplied*) is charging.
- 7 **Track indicator**
Indicates track and play times on an audio CD.

* supplied with the models for the countries other than U.S.A.

SECTION 2 DISASSEMBLY

Note: Follow the disassembly procedure in the numerical order given.

CABINET (UPPER) ASS'Y



SERVICE NOTES

Note for Check on Emission of Laser Diode

Laser beam of this set is focus on the reflective side of a disc by means of an objective lens within the optical pick-up. Therefore, when checking that the laser diode is emitting, the eyes should be kept away 30 cm or more from the objective lens.


How to Check Laser Diode

This set is designed so that in normal mode, the laser diode will not emit unless the upper lid is closed and S810 (push switch type) is turned ON. However, while in service mode, the laser diode is always emitting even when S810 is not turned ON.

To check the laser diode, there are the following two methods:

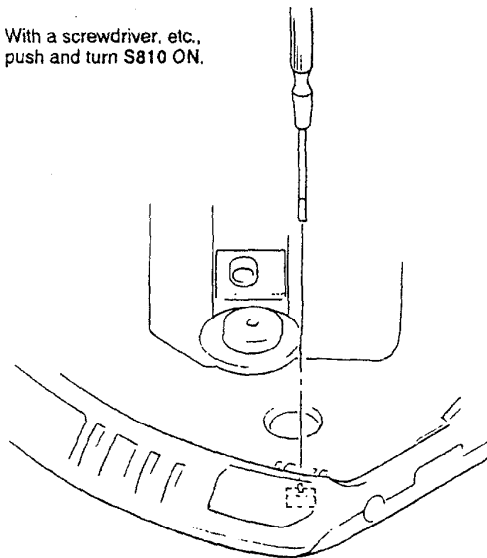
- **Method (Service Mode or Normal Mode):**

To visually check that the laser diode is emitting.

1. Open the upper lid.
2. Turn S810 ON as indicated in the figure.
(This is not required in Service mode.)
3. Push  key.
4. Observe the objective lens and check that the laser diode is emitting.
If no emission, faults in the automatic power control circuit or optical pick-up.

Note that in normal mode, the laser diode is energized for approx. 2.5 seconds to perform focus search.

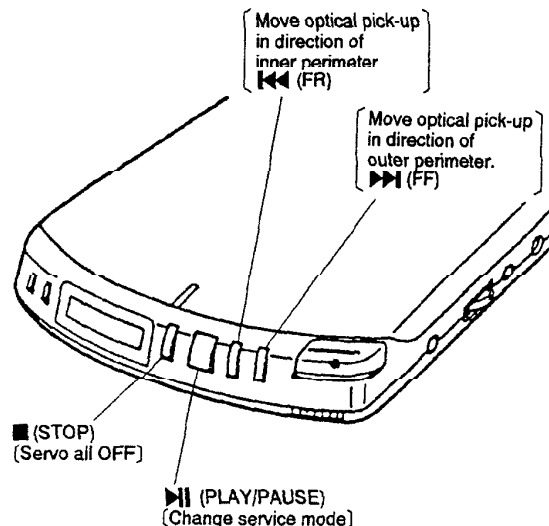
With a screwdriver, etc.,
push and turn S810 ON.



Service Mode (Service Program)

Just like the conventional model, this set has a service program built in a microcomputer.

The following describes how to operate this service program.

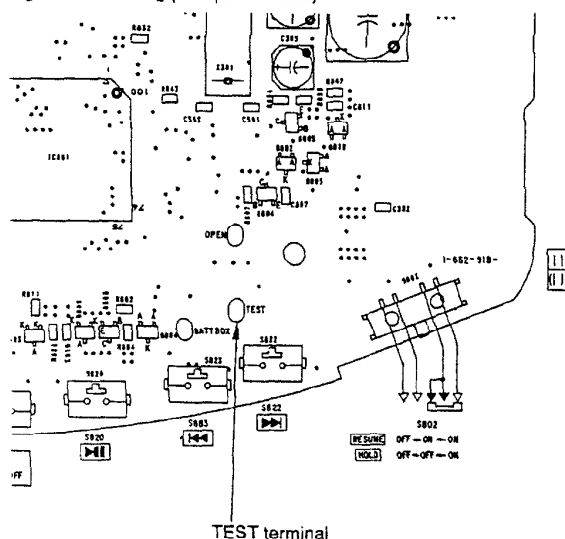


Each operation indicated in () is active in service mode.
Refer to Step 2 for details.









- **Step 1 (To Set Service Mode)**

1. Solder bridge the TEST terminal.
2. Apply 6 Vdc from the external power voltage jack.

【MAIN BOARD】 (Component Side)



• **Step 2 (Operations in Service Mode)**

1. When the service mode is set, the LCD provides six different displays and these displays are repeated.
(Each time the  key is pushed, the mode changes from one to another as shown below.)
2. Push the  key and after the  key to move the optical pick-up towards the inner perimeter.
Push the  key to move the optical pick-up towards the outer perimeter.
This operation will turn Tracking Servo and Sled Servo OFF.
So, push the  key if necessary.
3. When the  key is pushed, the system performs Focus Search and then turns Focus ON, entering CLV-S (pull mode). Tracking Servo and Sled Servo are turned ON. Without disc, Focus Search will be repeated.
4. When the  key is pushed, CLV-A (Servo for PLAY) is turned ON, and set start playing.
5. When the  key is pushed, all Servo systems (Focus, Tracking and Sled) are turned OFF. However, the disc motor will continue to rotate for a while due to inertia.

• **Step 3 (To Release Service Mode)**

1. First, be sure to remove the external power voltage. Remove the soldered bridge connected in Step 1.
2. Apply the external power voltage again. Now the service mode is released.

SECTION 4 ELECTRICAL ADJUSTMENTS

Precautions for Adjustments

- Before beginning adjustment, set the equipment to service mode.
After the completion of adjustment, be sure to reset the service mode.
(For more information, see "Service Mode (Service Program)" on page 5.)
- Perform adjustments in the order given.
- Use YEDS-18 disc (Part No.: 3-702-101-01) unless otherwise indicated.
- Power supply voltage requirement: DC6 V
VOL (volume) control: minimum
HOLD/RESUME switch: OFF

Before Beginning Adjustments

Set the equipment to Service Mode and check the following. If there is an error, repair the equipment.

• Checking of the Sled Motor

- Push the **▶▶** key and after push the **▶▶** or **◀◀** keys and check that the optical pick-up can move smoothly without sluggishness or abnormal noise in innermost periphery → outermost periphery → innermost periphery.
▶▶ : The optical pick-up moves outwardly.
◀◀ : The optical pick-up moves inwardly.

• Checking of Focus Searching

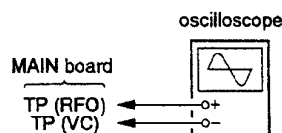
- Press the **▶▶** key. (Focus searching operation is activated continuously.)
- Check the objective lens of the optical pick-up for smooth up/down motion without sluggishness or abnormal noise.
- Press the **■** key.
Check that focus searching operation is deactivated. If not, again push the **■** key slightly longer.

Focus Bias Adjustment

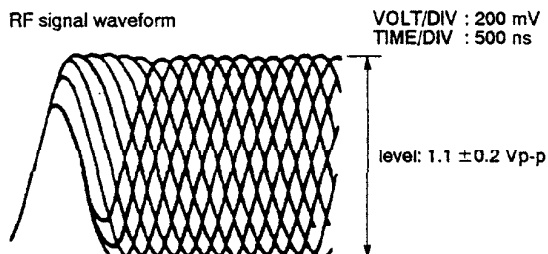
This adjustment is to be done when the optical pick-up block is replaced.

Condition: Hold the set in horizontal state.

Procedure:



- Connect the oscilloscope to the TP (RFO) and TP (VC) on the MAIN board.
- Set the equipment to service mode stop state.
- Push the **▶▶** key and after move the optical pick-up by pushing the **▶▶** or **◀◀** keys.
(To display the eye pattern more clearly, move the optical pick-up to the music range of the disc.)
- Put the disc (YEDS-18).
- Push the **▶▶** key.
(From focus searching, focus is turned ON while entering CLV drawing-in mode. Tracking and sled are turned ON.)
- Push the **▶▶** key. CLV-A (Servo for PLAY) is turned ON.
- Adjust RV502 so that the oscilloscope waveform eye pattern is good. A good eye pattern means that the diamond shape (◊) in the center of the waveform can be clearly distinguished.



To watch the eye pattern, set the oscilloscope to AC range and increase the vertical sensitivity of the oscilloscope for easy watching.

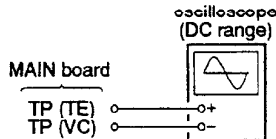
- Stop revolving of the disc motor by pressing the **■** key.
When the voltage between TP (FE OFFSET) and TP (VC) is as listed below, perform adjustment with the RV502 as follows:
No adjustment is required if voltage is -15 mV to +40 mV, or otherwise adjust as follows.
Below -15 mV → -15 mV
Over +40 mV → +40 mV
- After the completion of adjustment, reset service mode. (See page 6.)

E-F Balance Adjustment

This adjustment is to be done when the optical pick-up block is replaced.

Condition: Hold the set is horizontal state.

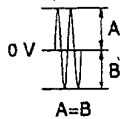
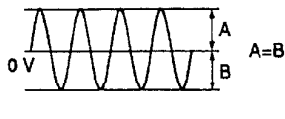
Procedure:



1. Put the set into test mode.
2. Connect oscilloscope between TP (TE) and TP (VC).
3. Press ►► and ◄◄ buttons to move the optical pick-up to the center.
4. Insert disc (YEDS-18) in and press ►► button.
5. Adjust RV501 so that the oscilloscope traverse waveform is symmetrical, as shown in the figure below.
6. Release test mode after adjustment is completed.

VOLT/DIV: 1 V
TIME/DIV: 1ms

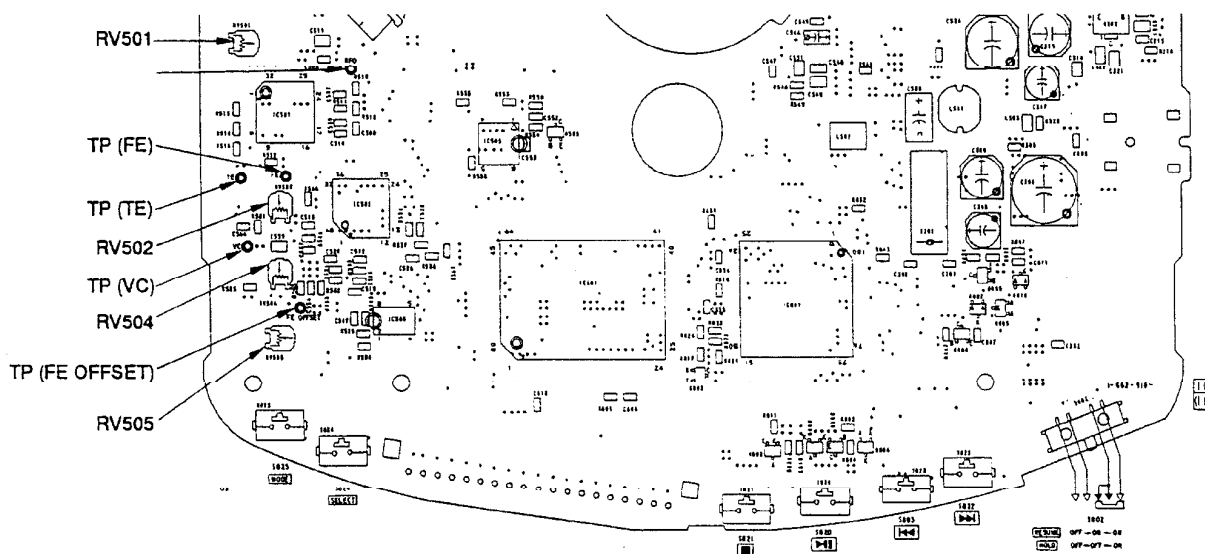
Note: Take long sweep time for easy monitoring.



Adjustment value: $2.8 \pm 1.4 \text{ Vp-p (A + B)}$

Adjustment Location:

[MAIN BOARD] (Component Side)



REFERENCE

Focus/Tracking Gain Adjustment

A servo analyzer is necessary in order to perform this adjustment exactly.

However, this gain has a margin, so even if it is slightly off, there is no problem. Therefore, do not perform this adjustment.

Focus/tracking gain determines the pick-up follow-up relative to mechanical noise and mechanical shock when the 2-axis device operates. However, as these reciprocate, the adjustment is at the point where both are satisfied.

- When gain is raised, the noise when 2-axis device operates increase.
- When gain is lowered, it is more susceptible to mechanical shock and skipping occurs more easily.

This adjustment has to be performed upon replacing any of the following parts.

- Optical pick-up
- RV505 (Focus gain VR)
- RV504 (Tracking gain VR)

Normally, be sure not to move RV505 and RV504.

Adjustment method:

This adjustment is not performed.

If RV505 or RV504 is turned, set to mechanical center.

SECTION 6 EXPLODED VIEWS



NOTE:


- -XX and -X mean standardized parts, so they may have some difference from the original one.

- Color Indication of Appearance Parts
Example:
KNOB, BALANCE (WHITE) ... (RED)

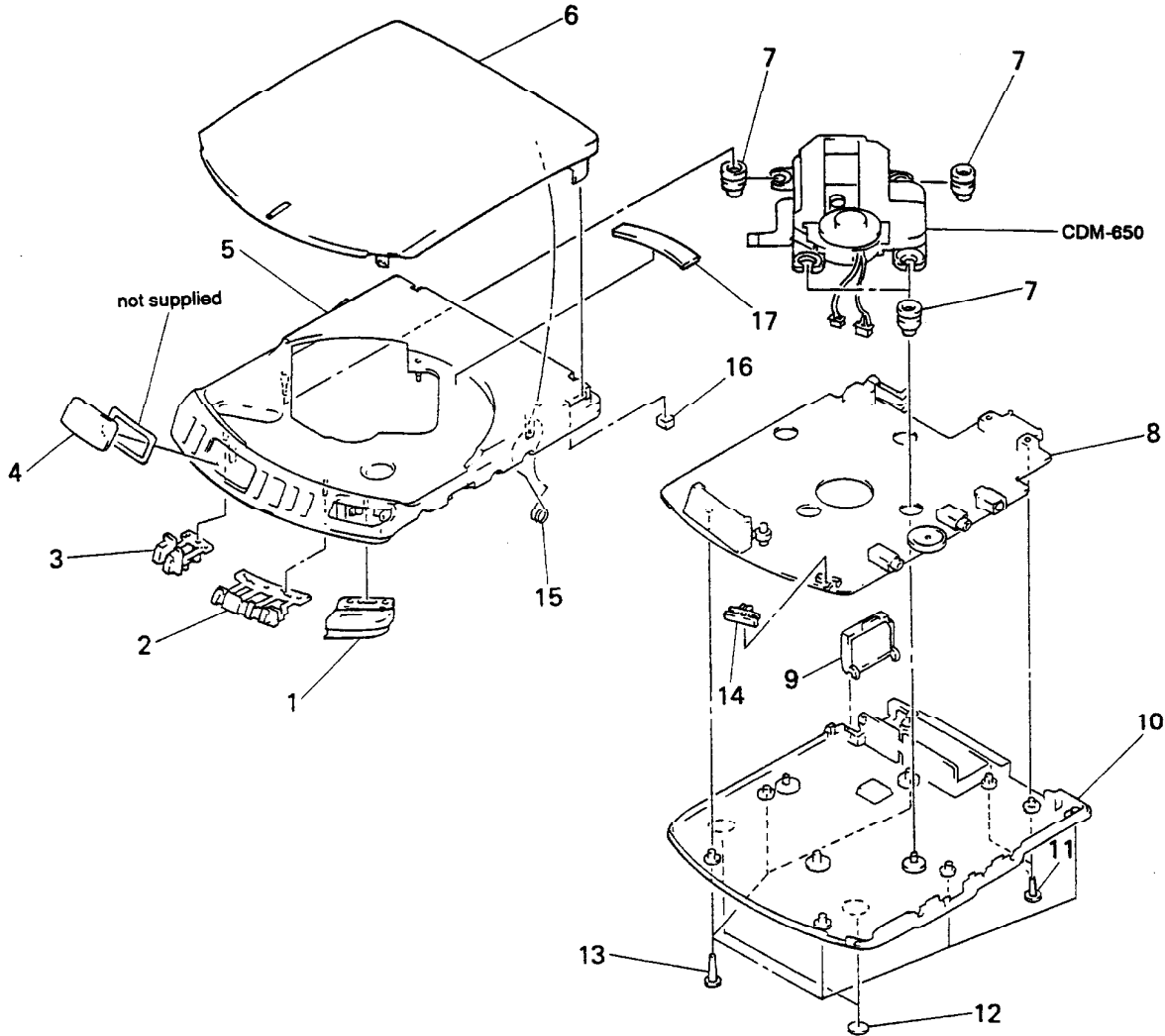
↑ ↑
Parts Color Cabinet's Color





- Items marked "*" are not stocked since they are seldom required for routine service. Some delay should be anticipated when ordering these items.
- The mechanical parts with no reference number in the exploded views are not supplied.
- Accessories and packing materials are given in the last of the electrical parts list.

The components identified by mark  or dotted line with mark  are critical for safety. Replace only with part number specified.

Les composants identifiés par une marque  sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.

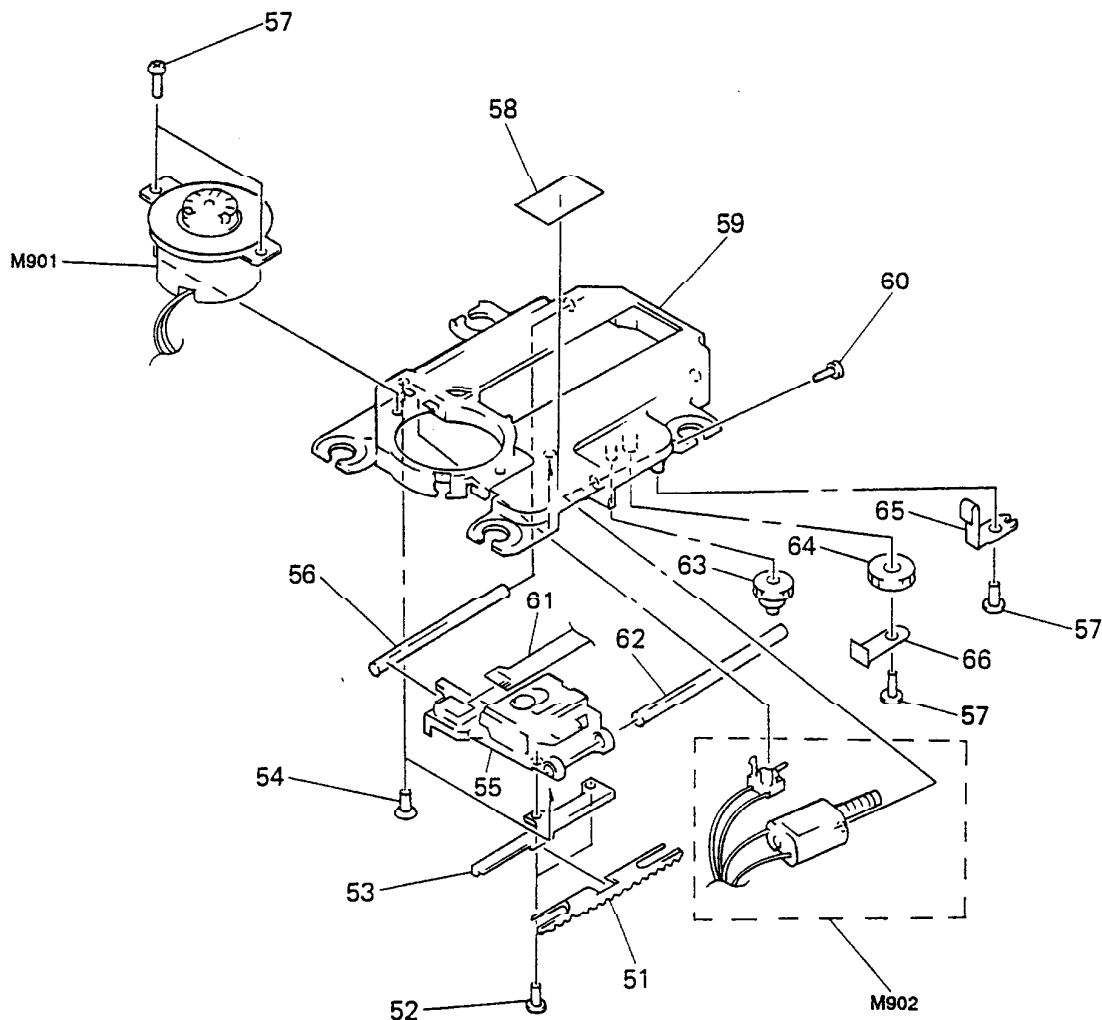
(1) CABINET SECTION



Ref. No.	Part No.	Description	Remark
1	4-980-245-01	BUTTON, OPEN	
2	4-980-248-01	BUTTON (R), CONTROL ( /  /  / )	
3	4-980-249-01	BUTTON (L), CONTROL (MODE/SELECT)	
4	4-980-246-01	WINDOW, LCD	
5	4-980-237-01	CABINET (UPPER)	
6	X-4947-724-1	LID ASSY, UPPER	
7	4-969-985-21	INSULATOR	
* 8	A-3293-252-A	MAIN BOARD, COMPLETE	
9	X-4946-967-1	LID ASSY, BATTERY CASE	

Ref. No.	Part No.	Description	Remark
10	4-980-238-01	CABINET (LOWER)	
11	3-318-203-31	SCREW (B1.7X8), TAPPING	
12	4-983-414-01	FOOT, RUBBER	
13	3-336-395-01	SCREW (B2X10) (G), TAPPING	
14	4-980-230-01	KNOB, SLIDE	
15	4-980-244-01	SPRING, UPPER LID SWITCHING	
16	4-984-450-01	CUSHION (D)	
* 17	4-976-350-01	CUSHION	

(2) OPTICAL PICK-UP SECTION
(CDM-650)



Ref. No.	Part No.	Description	Remark
51	4-981-197-01	RACK	
52	4-912-432-01	SCREW (B1.4X5), TAPPING	
* 53	4-981-196-01	BASE, RACK	
54	4-941-983-01	SCREW (B1.7X6), SPECIAL	
△ 55	A-3250-712-A	OPTICAL PICK-UP DAX-02S	
* 56	4-981-202-01	SHAFT (A), SLED	
57	3-318-203-71	SCREW (B1.7X5), TAPPING	
58	4-981-208-01	SHEET, BLIND	
* 59	4-981-194-01	CHASSIS	

Ref. No.	Part No.	Description	Remark
60	3-345-648-01	SCREW (M1.4X3)	
61	1-656-318-11	SLIDE FLEXIBLE BOARD	
* 62	4-981-203-01	SHAFT (B), SLED	
63	4-981-199-01	GEAR (B)	
64	4-981-200-01	GEAR (C)	
65	4-981-201-01	SPRING, SLED	
* 66	4-981-571-01	RETAINER, GEAR	
M901	A-3304-969-A	MOTOR ASSY, T.T. (SPINDLE)	
M902	A-3304-598-A	MOTOR ASSY, SLED	

Note:
The components identified by mark **△** or dotted line with mark **△** are critical for safety. Replace only with part number specified.

Note:
Les composants identifiés par une marque **△** sont critiques pour la sécurité. Ne les remplacer que par une pièce portant le numéro spécifié.